

What is claimed is:

1. A computing system comprising:  
a packet transmission network;  
a plurality of modules coupled to the packet transmission network, each functional module having packet handling circuitry for generating and receiving packets conveyed by the packet transmission network; and  
a routing control mechanism for controlling the flow of packets on the packet transmission network, the routing control mechanism being connected to the packet transmission network, wherein each module is operable to generate to the routing control mechanism a transfer request to request transfer of a current packet and an arbitration request a routing decision for a later packet.
2. The computing system of claim 1 wherein the arbitration request includes a destination indicator for the later packet.
3. The computing system of claim 1 wherein the routing control mechanism accepts the arbitration request and makes a routing decision relating to the arbitration request while implementing the transfer of the current packet requested by the transfer request.
4. The computer system of claim 1, wherein the arbitration request relates to a packet generated after the current packet by the same module as generated the current packet.
5. The computer system of claim 1, wherein at least one of the plurality of modules acts as an initiator modules for generating request packets for implementing transactions, each

request packet including the destination indicator.

6. The computer system of claim 1, wherein at least one of the plurality of modules acts as a target modules for receiving the request packets and for issuing response packets in response to the request packets.

7. The computer system of claim 1, wherein the routing control mechanism is operable to issue an arbitration grant signal indicating that it has committed an arbitration decision in response to an arbitration request.

10. A device for connection to a packet transmission network and having packet handling circuitry for generating and receiving packets conveyed by the packet transmission network, the device being operable to generate packet flow control requests on the packet transmission network, the flow control requests including:

a transfer request to request transfer of a first packet;  
and

an arbitration request with a destination indicator identifying a destination of a second packet.

11. The device for connection to a packet transmission network of claim 10 wherein the arbitration request is issued when the second packet is ready for transfer.

12. The device for connection to a packet transmission network of claim 10 wherein the arbitration request is issued while a transfer of the first packet requested by the transfer request is occurring.

13. The device for connection to a packet transmission network of claim 10 wherein the device receives a handshake control signal from the packet transmission network indicating

that the packet transmission network is committed to transfer the second packet.

14. The device for connection to a packet transmission network of claim 13 wherein the device responds to the handshake control signal by making a subsequent arbitration request for a third packet.

15. A packet routing mechanism for routing packets between a source device and a destination device that are interconnected via a packet transmission network, the routing mechanism comprising:

- an arbitration mechanism coupled to the packet transmission network to receive requests from the source device and operable to make routing decisions for each packet for which a request is received;

- a decision queue for storing at least one decision which has been made by the arbitration mechanism; and

- a flow control mechanism coupled to the arbitration mechanism and the decision queue and operable to issue a handshake control to the source device in response to the request indicating that a routing decision has been made; and

- a transfer mechanism coupled to the packet transmission network for implementing a packet transfer according to a stored routing decision, wherein the arbitration mechanism is configured to make an routing decision for a later packet while a current packet is being transferred by the transfer mechanism.

16. The packet routing mechanism of claim 15 wherein the arbitration decisions is made based in part on availability of a target device.

17. The packet routing mechanism of claim 15 wherein the

transfer mechanism implements a packet transfer by asserting a grant send to the source device and a send to the target device.

18. The packet routing mechanism of claim 15 wherein the handshake control comprises a net grant signal indicating the packet routing network will be ready to accept the later packet on completion of the transfer of the current packet.

19. A method for making pipelined routing decisions in a computer system comprising:

providing a plurality of source devices and destination devices interconnected via a packet transmission network;

generating a transfer request for a current packet with a source device;

generating an arbitration request for a later packet; and

effecting a transfer of the current packet based on an earlier routing decision while making a routing decision in relation to the later packet.

20. The method of claim 19, wherein the arbitration request relates to a packet to be transferred after the current packet.

21. The method of claim 19 further comprising:

acknowledging the arbitration request by an arbitration grant control signal.

22. The method of claim 19 further comprising:

causing a target device to indicate that it is in a state to accept a packet by asserting a grant signal.